DSA Homework 10: Heuristic Algorithms

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1 Results

For local search method, I used a reinsert a single city back into the path. For every path, I reinserted a city 10,000 times and found the optimal path each time. I thought that by doing this I would get very close to the correct solution, which I did, but still I was further away than I anticipated. The results are shown below.

	17 city path	21 city path	24 city path	48 city path
algorithm solution	2123	2747	1349	5319
optimality gap	0.018	0.014	0.060	0.054
time (seconds)	0.175	0.211	0.233	0.406

Table 1: Results from Traveling Salesman Problem Algroithm

Based on these results, it makes sense to me that the less cities in the path, generally the closer to optimal since the total number of city reinserts was held constant. Furthermore, it makes sense that the time increases relatively linearly because even though the greedy algorithm runs in $O(n^2)$ time, this function only runs once and the overall runtime is dominated by the 10,000 loops through the city reinsertion problem which runs in $O(n)$ time.